

**IN THE DRAWINGS:**

The attached sheet of drawings includes changes to Fig. 8. This sheet replaces the original sheet including Fig. 8. In Fig. 8, 212 has been replaced by 112 to correspond with the specification. Additionally, a minor editorial error regarding cross hatching of item 104 has been corrected.

**Attachment:        Replacement Sheet**  
**Annotated Sheet Showing Changes**

## REMARKS

This is intended as a full and complete response to the Office Action dated June 25, 2007, having a shortened statutory period for response set to expire on September 25, 2007. Please reconsider the claims pending in the application for reasons discussed below.

In the specification, the paragraphs 0031, 0038, 0048 and 0049 have been amended to correct minor editorial problems.

In amended Figure 8, 212 has been replaced by 112 to correspond with the specification. Additionally, a minor editorial error regarding cross hatching of item 104 has been corrected.

Claims 1-38 and 40-45 remain pending in the application and are shown above. Claims 39 and 46 have been canceled by the Applicant. Claims 1-46 are rejected by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 2 - 9, 11-15, 17, 19-24, 28, 29, 31-38, 43, and 44 are amended to correct matters of form. Claims 40 and 41 are amended to independent form. Claims 42 and 45 are amended to clarify the invention.

### ***Claim Rejections – 35 U.S.C. 112***

Claim 20 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 20 has been amended to remove “the condition.” Therefore, proper antecedent basis exists for amended claim 20.

### ***Claim Rejections – 35 U.S.C. 102***

Claims 1, 2, 4, 15, 21, 22, 23, 30 and 39 are rejected under 35 U.S.C. § 102(a) as being anticipated by *Mitsui, et al* (U.S. Publ. No. 2003/0185664). Claims 42, 43, 44 and 46 are rejected under 35 U.S.C. § 102(a) as being anticipated by *White* (U.S. Patent No. 6,577,923). Applicant respectfully traverses these rejections.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Regarding claim 1, the Examiner states that Mitsui shows a method for transferring a substrate in a processing system having at least one processing chamber coupled to a transfer chamber housing a robot ([0020], Fig. 1), the method comprising: teaching a robot to move to an exchange position defined in a processing system ([0077]); and correcting motion of the robot to compensate for a shift in the exchange position ([0082]).

However, Mitsui fails to teach compensating for a shift in the exchange position and correcting motion of the robot to compensate for a shift in the exchange position. In the cited paragraphs, Mitsui teaches moving a substrate to a predetermined Z position based on the size of a mask substrate input into a control computer. A sensor placed below the substrate monitors the vertical position of the substrate, and the control computer corrects the robot to compensate for deflection of the end effector [0082]. Therefore, Mitsui teaches correcting the motion of the robot to compensate for a shift in the position of the end effector portion of the robot, not a shift in the exchange position.

Thus, Mitsui fails to teach, show or suggest a method for transferring a substrate in a processing system having at least one processing chamber coupled to a transfer chamber housing a robot, the method comprising: teaching a robot to move to an exchange position defined in a processing system; and correcting motion of the robot to compensate for a shift in the exchange position as recited in claim 1 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 2, the Examiner states that Mitsui shows the correcting further comprises: monitoring a condition within the processing system ([0083]); determining the shift in exchange position based on the monitored condition ([0083]); and correcting robot motion to compensate for the determined shift in the exchange position ([0087]).

However, in addition to failing to anticipate claim 1, Mitsui fails to teach determining the shift in exchange position based on the monitored condition and correcting motion of the robot to compensate for the shift in the exchange position. In the cited paragraphs, Mitsui teaches measuring the edge position of the substrate and correcting for a translation shift of the mask substrate, not a shift in the exchange position [0087].

Therefore, Mitsui fails to teach, show or suggest the method of claim 1, wherein the correcting further comprises: monitoring a condition within the processing system; determining the shift in exchange position based on the monitored condition; and correcting robot motion to compensate for the determined shift in the exchange position as recited in claim 2 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 4, the Examiner states that Mitsui shows the monitoring further comprises sensing a change in state of at least one processing chamber ([0083]). However, Mitsui teaches measuring the edge of the mask substrate, not sensing a change in state of the processing chamber [0083].

Thus, Mitsui fails to teach, show or suggest the method of claim 2, wherein the monitoring further comprises: sensing a change in state of the at least one processing chamber as recited in claim 4 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 15, the Examiner states that Mitsui shows the determining further comprises resolving a change in the exchange position based on empirical data ([0087]). However, Mitsui teaches resolving a translational shift of the mask substrate, not a change in the exchange position [0087].

Therefore, Mitsui fails to teach, show or suggest the method of claim 2, wherein the determining further comprises: resolving a change in the exchange position based on empirical data as recited in claim 15 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 21, the Examiner states that Mitsui shows the correcting further comprises measuring a change in at least one of the position and orientation of at least

one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the detected changes ([0081 – 0086]).

Mitsui fails to teach measuring a change in the position or orientation of a processing chamber relative to a transfer chamber. In the cited paragraphs, Mitsui teaches measuring the positional shift of a mask substrate on the end effector of a robot and correcting the motion of the robot to compensate for that shift, not measuring a change in position or orientation of a processing chamber relative to the transfer chamber [0081-0086].

Therefore, Mitsui fails to teach, show or suggest the method of claim 1, wherein the correcting further comprises: measuring a change in at least one of the position and orientation of the at least one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the detected changes as recited in claim 21. Applicant requests withdrawal of this rejection.

Regarding claim 22, the Examiner states that Mitsui shows the correcting further comprises sensing a change in at least one of the position and orientation of at least one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the sensed changes ([0081 – 0086]).

However, Mitsui fails to teach sensing a change in the position or orientation of a processing chamber relative to a transfer chamber. In the cited paragraphs, Mitsui teaches measuring the positional shift of a mask substrate on the end effector of a robot and correcting the motion of the robot to compensate for that shift, not sensing a change in position or orientation of a processing chamber relative to a transfer chamber [0081-0086].

Therefore, Mitsui fails to teach, show or suggest the method of claim 1, wherein the correcting further comprises: sensing a change in at least one of the position and orientation of the at least one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the sensed changes as recited in claim 22. Applicant requests withdrawal of this rejection.

Regarding claim 23, the Examiner states that Mitsui shows the correcting further comprises resolving a change in at least one of the position and orientation of at least

one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the detected changes ([0081 – 0086]).

However, Mitsui fails to teach resolving a change in the position or orientation of a processing chamber relative to a transfer chamber. In the cited paragraphs, Mitsui teaches measuring the positional shift of a mask substrate on the end effector of a robot and correcting the motion of the robot to compensate for that shift, not resolving a change in the position or orientation of a processing chamber relative to a transfer chamber [0081-0086].

Therefore, Mitsui fails to teach, show or suggest the method of claim 1, wherein the correcting further comprises: resolving a change in at least one of the position and orientation of the at least one processing chamber relative to the transfer chamber; and adjusting motion of the robot to compensate for the detected changes as recited in claim 23 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 30, the Examiner states that Mitsui shows a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot ([0020], Fig. 1), the method comprising: teaching the robot to move to an exchange position defined in the first processing chamber relative to a predefined reference point within the transfer chamber ([0072]); detecting a shift in the exchange position ([0083]); and correcting the taught robot motion to compensate for the shift in the exchange position ([0087]).

However, Mitsui fails to teach detecting a shift in the exchange position and correcting the taught robot motion to compensate for the shift in the exchange position. In the cited paragraphs, Mitsui teaches detecting the positional shift in a mask substrate positioned on the end effector of a robot and correcting the robot to compensate for the shift in a mask substrate, not the positional shift of an exchange position [0087].

Thus, Mitsui fails to teach, show or suggest a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot, the method comprising: teaching the robot to move to an exchange position defined in the first processing chamber relative to a predefined reference point within the transfer chamber; detecting a shift in the exchange position;

and correcting the taught robot motion to compensate for the shift in the exchange position as recited in claim 30, and claims depending therefrom. Applicant respectfully requests withdrawal of this rejection.

Regarding claim 42 the Examiner states that White shows a substrate processing system comprising: a transfer chamber (col 3, line 59); a processing chamber coupled to the transfer chamber (col 3, line 59-60); a robot disposed in the transfer chamber and adapted to transfer substrates between the transfer chamber and the processing chamber (col 2, line 39-42); at least one sensor adapted to provide a metric from which a change in position between the transfer chamber and the processing chamber may be resolved (col 6, line 24-28); and a controller coupled to the robot and adapted to provide instructions for correcting the robot's motions in response to the metric provided by the sensor (col 3, line 60).

Applicant has amended claim 42 to recite "at least one sensor adapted to provide a temperature metric from which a change in position between the transfer chamber and the processing chamber may be resolved" (emphasis added). White teaches a position sensor located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10). However, White does not disclose a temperature metric from which a change in position between the transfer chamber and the processing chamber may be resolved.

Therefore, White does not teach, show or suggest a substrate processing system comprising: a transfer chamber; a processing chamber coupled to the transfer chamber; a robot disposed in the transfer chamber and adapted to transfer substrates between the transfer chamber and the processing chamber; at least one sensor adapted to provide a temperature metric from which a change in position between the transfer chamber and the processing chamber may be resolved; and a controller coupled to the robot and adapted to provide instructions for correcting the robot's motions in response to the metric provided by the sensor as recited in amended claim 42 and claims depending therefrom. Applicant requests withdrawal of the rejection.

Regarding claim 43, the Examiner further states that White shows wherein at least one sensor provides temperature information of the transfer chamber (col 4, line

66 – col 5, line 3). White teaches a position located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10). However, White does not disclose providing temperature information of the transfer chamber from which a change in position between the transfer chamber and the processing chamber may be resolved.

Therefore, White does not teach, show or suggest the substrate processing method of claim 42, wherein the at least one sensor provides temperature information of the transfer chamber as recited in claim 43. Applicant requests withdrawal of the rejection.

Regarding claim 44, the Examiner further states that White shows wherein at least one sensor further comprises a plurality of temperature sensors providing metrics indicative of a temperature profile of the transfer chamber (col 4, line 66 – col 5, line 3). White teaches a position sensor located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10). However, White does not disclose providing metrics indicative of a temperature profile of the transfer chamber from which a change in position between the transfer chamber and the processing chamber may be resolved.

Therefore, White does not teach, show or suggest the substrate processing system of claim 42, wherein the at least one sensor further comprises a plurality of temperature sensors providing metrics indicative of a temperature profile of the transfer chamber as recited in claim 44. Applicant requests withdrawal of the rejection.

### ***Claim Rejections – 35 U.S.C. 103***

Claims 3, 5-12, 14, 16-20, 24-29, 31-35, 37, 38, 40 and 41 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Mitsui* (U.S. Publ. No. 2003/0185664) in view of *White* (U.S. Patent No. 6,577,923). Claim 45 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *White* (U.S. Patent No. 6,577,923) in view of *Mitsui* (U.S. Publ. No. 2003/0185664). Applicant respectfully traverses the rejections.



The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. See MPEP § 2142. To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See MPEP § 2143.

Regarding claim 3, the Examiner states that Mitsui shows all the elements of claim 3 except that the monitoring further comprises sensing a change in temperature within a portion of the processing system. The Examiner further states that White shows the monitoring further comprises sensing a change in temperature within a portion of the processing system (col 4, line 66 – col 5, line 3).

However, White does not teach sensing a change in temperature to determine the shift in exchange position. The cited lines state that a desired temperature and pressure are controlled within the substrate processing portion. In fact, White teaches a position sensor located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10).

Thus, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the monitoring further comprises: sensing a change in temperature within a portion of the processing system as recited in claim 3 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 5, the Examiner states that Mitsui shows all the elements of claim 5 except the sensing the change in temperature further comprises sensing a change in state of a second processing chamber.

Applicant has amended claim 5 to depend from claim 2, wherein the monitoring further comprises sensing a change in state of at least two processing chambers to provide proper antecedent basis for the claim. Applicant submits that Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein

the monitoring further comprises: sensing a change in state of at least two processing chambers as recited in claim 5. Applicant requests withdrawal of this rejection.

With regard to claim 6, the Examiner states that Mitsui shows all the elements of claim 6 except the monitoring further comprises sensing a change in state of a second processing chamber different than a first processing chamber having the exchange position defined therein. The Examiner further states that White shows the monitoring further comprises sensing a change in state of a second processing chamber different than a first processing chamber having the exchange position therein (col 4, line 66 – col 5, line 3; col 9, line 11).

White does not teach sensing a change in state of a second processing chamber different than a first processing chamber having the exchange position therein for determining the shift in exchange position. The cited lines state that a desired temperature and pressure are controlled within the substrate processing portion and that the approximate position of the slot of the desired load lock is determined. However, White teaches a position sensor located on a slot between a transfer chamber and a load lock and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor, not detecting a change in state of a second processing chamber different than a first processing chamber having the exchange position therein for determining the shift in exchange position (col. 6, lines 24-67; col. 7, lines 1-10).

Thus, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the monitoring further comprises: sensing a change in state of a second processing chamber different than a first processing chamber having the exchange position defined therein as recited in claim 6. Applicant respectfully requests withdrawal of this rejection.

With regard to claim 7, the Examiner states that Mitsui shows all the elements of claim 7 except monitoring further comprises detecting a change in temperature of at least one processing chamber. The Examiner continues that White shows the monitoring further comprises detecting a change in temperature of at least one processing chamber (col 4, line 66 – col 5, line 3).

However, White does not disclose detecting a change in temperature of at least one processing chamber for determining the shift in exchange position. The cited lines state that a desired temperature and pressure are controlled within the substrate processing portion. In fact, White teaches a position sensor located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the monitoring further comprises: detecting a change in temperature of the at least one processing chamber as recited in claim 7 and claims depending therefrom. Applicant requests withdrawal of the rejection.

Regarding claim 8, the Examiner states that White further shows the detecting the change in temperature further comprises sensing a change in temperature of a second processing chamber (col 9, line 9).

However, White does not disclose sensing a change in temperature of a second processing chamber for determining the shift in exchange position. The cited lines state that the approximate position of the slot of the desired load lock is determined, not that a change in temperature is sensed for determining the shift in exchange position (col. 9, lines 9-10).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 7, wherein the detecting the change in temperature further comprises: sensing a change in temperature of a second processing chamber as recited in claim 8. Applicant requests withdrawal of the rejection.

Regarding claim 9, the Examiner states that White further shows the detecting the change in temperature further comprises sensing a change in temperature of a processing chamber different than a processing chamber having the exchange position defined herein (col 9, line 9).

However, White does not disclose sensing a change in temperature of a second processing chamber different than a processing chamber having the exchange position define therein for determining the shift in exchange position. The cited lines state that

the approximate position of the slot of the desired load lock is determined, not that a change in temperature is sensed (col. 9, lines 9-10).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 7, wherein the detecting the change in temperature further comprises: sensing a change in temperature of a processing chamber different than a processing chamber having the exchange position defined therein as recited in claim 9. Applicant requests withdrawal of the rejection.

Regarding claim 10, the Examiner states that White further shows wherein the portion of the processing system is a facet of the transfer chamber through which the robot must extend to reach the exchange position (col 4, line 66).

However, White does not teach the robot extending through a facet to reach the exchange position. The cited lines disclose load locks configured to provide entry of a substrate into, or out of, the substrate processing portion while maintaining a desired temperature and pressure within the substrate processing portion (col. 4, line 66 – col. 5, line 2). In fact, White teaches a robot positioning a substrate within a load lock for transfer into a processing chamber via a conveyor, not that a robot extends through a facet to an exchange position in a processing chamber (col. 5, lines 15-18).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 3, wherein the portion of the processing system is a facet of the transfer chamber through which the robot must extend to reach the exchange position as recited by claim 10 and claims depending therefrom. Applicant requests withdrawal of the rejection.

Regarding claim 11, the Examiner states that White further shows wherein the sensing the change in temperature further comprises sensing a change in temperature of a different facet of the transfer chamber (col 9, line 9).

However, White does not teach sensing a change in temperature of a different facet of the transfer chamber determining the shift in exchange position. The cited lines state that the approximate position of the slot of the desired load lock is determined (col. 9, lines 9-10). The position of the slot is determined through the use of position sensors, not temperature sensors (col. 9, lines 15-58).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 10, wherein the sensing the change in temperature further comprises: sensing a change in temperature of a different facet of the transfer chamber as recited in claim 11. Applicant requests withdrawal of this rejection.

Regarding claim 12, the Examiner states that Mitsui shows all the elements of claim 12 except wherein the determining further comprises sensing a change in position of the processing chamber. The Examiner further states that White shows wherein the determining further comprises sensing a change in position of the processing chamber.

However, White does not teach sensing a change in position of the processing chamber. In fact, White teaches a position sensor located on a slot between a transfer chamber and a processing chamber and a controller adapted to correct a robot's motions in response to the positional metric provided by the sensor (col. 6, lines 24-67; col. 7, lines 1-10).

Therefore, Mitsui and White, alone or in combination, do not teach the method of claim 2, wherein the determining further comprises: sensing a change in position of the processing chamber as recited in claim 12 and claims depending therefrom. Applicant requests withdrawal of this rejection.

The Examiner does not cite any reasoning for the rejection of claim 13-14; therefore, Applicant requests withdrawal of these rejections.

Regarding claim 16, the Examiner states that Mitsui shows all the elements of claim 16 except wherein the empirical data is representative of a change in at least one of position and orientation of the processing chamber relative to the transfer chamber due to thermal effects. The Examiner further states that White shows wherein the empirical data is representative of a change in at least one of position and orientation of the processing chamber relative to the transfer chamber due to thermal effects.

Applicant submits that the Examiner errs in this assertion. In fact, White teaches that the position of the slots are stored in memory contained in the controller, and are not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 15, wherein the empirical data is representative of a change in at least one of position and orientation of the processing chamber relative to

the transfer chamber due to thermal effects as recited in claim 16. Applicant requests withdrawal of this rejection.

Regarding claim 17, the Examiner states that Mitsui shows all the elements of claim 17 except wherein the determining further comprises resolving a change in the exchange position based on modeled data. The Examiner further states that White shows wherein the determining further comprises resolving a change in the exchange position based on modeled data.

However, the Examiner cites no specific portion of White, and Applicant cannot find any reference in White to support the Examiner's assertion. Applicant submits that White does not teach resolving a change in the exchange position based on modeled data.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the determining further comprises: resolving a change in the exchange position based on modeled data as recited in claim 17 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 18, the Examiner states that White shows wherein the modeled data is representative of a change in at least one of position and orientation of the processing chamber relative to the transfer chamber due to thermal effects (col 9, line 40-58).

However, White does not teach modeled data representative of a change in the position or orientation of the processing chamber relative to the transfer chamber due to thermal effects. The cited lines disclose that the controller derives the actual position of the translational position sensor relative to the position of end effectors using geometry of the robot's arms. Moreover, the translational position sensor is connected to the load lock (and slot) in a manner that when the load lock moves due to thermal expansion, the translational position sensor is similarly displaced. In fact, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Thus, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 17, wherein the modeled data is representative of a change in at least one of position and orientation of the processing chamber relative to the transfer

chamber due to thermal effects as recited in claim 18. Applicant requests withdrawal of this rejection.

Regarding claim 19, the Examiner states that Mitsui shows all the elements of claim 19 except wherein the monitoring the condition further comprises tracking time between state changes of at least one processing chamber (col 4, line 53 – col 5, line 7). The Examiner further states that White shows wherein the monitoring the condition further comprises tracking time between state changes of at least one processing chamber.

However, the cited lines do not teach tracking time between state changes of at least one processing chamber. In fact, Applicant does not find any suggestion in White for tracking time between state changes of at least one processing chamber.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the monitoring the condition further comprises: tracking time between state changes of at least one processing chamber as recited in claim 19. Applicant requests withdrawal of the rejection.

Regarding claim 20, the Examiner states that Mitsui shows all the elements of claim 20 except wherein the determining further comprises accounting for rates of thermal expansion. The Examiner further states that White shows wherein the determining further comprises accounting for rates of thermal expansion.

However, White does not teach accounting for rates of thermal expansion in determining the shift in exchange position. In fact, White teaches that the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 2, wherein the determining further comprises: accounting for rates of thermal expansion as recited in claim 20. Applicant requests withdrawal of the rejection.

Regarding claim 24, the Examiner states that Mitsui shows all the elements of claim 24 except wherein the resolving changes further comprises at least one of modeling thermal expansion of the transfer chamber, modeling thermal expansion of the processing chamber, and utilizing empirical data that is representative of relative

positions of the processing chamber relative to the transfer chamber due to thermal effects. The Examiner further states that White shows wherein the resolving changes further comprises at least one of modeling thermal expansion of the transfer chamber, modeling thermal expansion of the processing chamber, and utilizing empirical data that is representative of relative positions of the processing chamber relative to the transfer chamber due to thermal effects.

White does not teach modeling thermal expansion of the transfer chamber, modeling thermal expansion of the processing chamber, or utilizing empirical data that is representative of relative positions of the processing chamber relative to the transfer chamber due to thermal effects to resolve changes in the position or orientation of a processing chamber relative to the transfer chamber. To the contrary, White discloses that the controller derives the actual position of the translational position sensor relative to the position of end effectors using geometry of the robot's arms. Moreover, the translational position sensor is connected to the load lock (and slot) in a manner that when the load lock moves due to thermal expansion, the translational position sensor is similarly displaced (col 9, lines 40-58). In fact, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 23, wherein the resolving changes further comprises at least one of modeling thermal expansion of the transfer chamber, modeling thermal expansion of the processing chamber, and utilizing empirical data that is representative of relative positions of the processing chamber relative to the transfer chamber due to thermal effects as recited in claim 24. Applicant requests withdrawal of this rejection.

Regarding claim 25, the Examiner states that Mitsui shows all the elements of claim 25 except wherein the shift in the exchange position is due to a change in the thermal profile of the transfer chamber. The Examiner further states that White shows wherein the shift in the exchange position is due to a change in the thermal profile of the transfer chamber.

White discloses that temperature variations between different load locks and process chambers lead to relative thermal expansion or contraction (col 1, line 67 – col



2, line 2). However, White does not teach the shift in an exchange position is due to a change in the thermal profile of the transfer chamber.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 1, wherein the shift in the exchange position is due to a change in the thermal profile of the transfer chamber as recited in claim 25. Applicant requests withdrawal of this rejection.

Regarding claim 27, the Examiner states that Mitsui shows a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot ([0020], Fig. 1), the method comprising: defining an exchange position of the first processing chamber ([0077]); correcting robot motion to compensate for the shift in the exchange position ([0087]). The Examiner further states that White shows sensing temperature of at least one component of the system that results in a shift in the exchange position (col 4, line 66 – col 5, line 3); resolving the shift in exchange position corresponding to the sensed temperature (col. 9, line 40).

However, Applicant respectfully submits that the Examiner errs in this assertion. First, Mitsui fails to teach correcting robot motion to compensate for the shift in the exchange position. In fact, Mitsui teaches measuring the edge position of the substrate and correcting for a translation shift of the mask substrate, not a shift in the exchange position [0087].

Additionally, White does not teach sensing temperature of at least one component of the system that results in a shift in the exchange position and resolving the shift in exchange position corresponding to the sensed temperature. White discloses that the controller derives the actual position of the translational position sensor relative to the position of end effectors using geometry of the robot's arms, not by sensing temperature. Moreover, the translational position sensor is connected to the load lock (and slot) in a manner that when the load lock moves due to thermal expansion, the translational position sensor is similarly displaced (col 9, lines 40-58). In fact, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Thus, Mitsui and White, alone or in combination, do not teach, show or suggest a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot, the method comprising: defining an exchange position of the first processing chamber; sensing temperature of at least one component of the system that results in a shift in the exchange position; resolving the shift in exchange position corresponding to the sensed temperature; and correcting robot motion to compensate for the shift in the exchange position as recited in claim 27 and claims depending therefrom. Applicant requests withdrawal of this rejection.

Regarding claim 28, the Examiner states that White shows wherein the sensing further comprises sensing a temperature of at least one facet of the transfer chamber (col. 9, line 66).

However, White does not disclose sensing a temperature of a facet of the transfer chamber. In fact, the cited lines disclose that the base of the robot is moved to roughly align the robot with the slot in the load lock as determined by the controller, the position of which is not exactly known due to thermal expansion.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 27, wherein the sensing further comprises: sensing a temperature of at least one facet of the transfer chamber as recited in claim 28. Applicant requests withdrawal of this rejection.

Regarding claim 29, the Examiner states that White shows wherein the resolving further comprises determining a change in a least one of the position and orientation of a facet of the transfer chamber from which the temperature was sensed (col 9, line 17-19).

However, White does not disclose sensing temperature to determine a change in the position or orientation of a facet of the transfer chamber. In fact, the exact slot position is not known due to thermal expansion of the substrate processing portion, but the controller translationally aligns the end effector or substrate with the slot in the load lock through communication with a translational position sensor, not a temperature sensor. Furthermore, the position of the slot is stored in memory contained in the

controller and is not calibrated to compensate for thermal expansion (col. 9, lines 14-58).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 27 wherein the resolving further comprises: determining a change in at least one of the position and orientation of a facet of the transfer chamber from which the temperature was sensed as recited in claim 29. Applicant requests withdrawal of this rejection.

Regarding claim 31, the Examiner states that Mitsui shows all the elements of claim 31 except wherein the detecting further comprises sensing a temperature profile of the transfer chamber. The Examiner further states that White shows wherein the detecting further comprises sensing a temperature profile of the transfer chamber (col 4, line 66 – col 5, line 3).

White does not disclose sensing a temperature profile of the transfer chamber for detecting a shift in the exchange position. In fact, the lines cited by the Examiner state that load locks are configured to provide entry of a substrate into, or out of, the substrate processing portion while maintaining a desired temperature and pressure within the substrate processing portion, not that a temperature profile is used for detecting a positional shift (col. 4, line 66 – col. 5, line 3).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: sensing a temperature profile of the transfer chamber as recited in claim 31. Applicant requests withdrawal of this rejection.

Regarding claim 32, the Examiner states that Mitsui shows all the elements of claim 32 except wherein the detecting further comprises modeling a temperature profile of the transfer chamber based on a change in state of the first processing chamber. The Examiner further states that White shows wherein the detecting further comprises modeling a temperature profile of the transfer chamber based on a change in state of the first processing chamber (col 9, line 40-58).

However, White does not disclose modeling a temperature profile of the transfer chamber in detecting a shift in the exchange position. White discloses that the controller derives the actual position of the translational position sensor relative to the

position of end effectors using geometry of the robot's arms, not by modeling a temperature profile of the transfer chamber. Moreover, the translational position sensor is connected to the load lock (and slot) in a manner that when the load lock moves due to thermal expansion, the translational position sensor is similarly displaced (col 9, lines 40-58). In fact, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30 wherein the detecting further comprises: modeling a temperature profile of the transfer chamber based on a change in state of the first processing chamber as recited in claim 32. Applicant requests withdrawal of this rejection.

Regarding claim 33, the Examiner states that Mitsui shows all elements of claim 33 except wherein the detecting further comprises modeling a temperature profile of the transfer chamber based on a change in state of a second processing chamber coupled to the transfer chamber. The Examiner further states that White shows wherein the detecting further comprises modeling a temperature profile of the transfer chamber based on a change in state of a second processing chamber coupled to the transfer chamber (col 9, line 8-58).

Applicant submits the Examiner errs in this assertion. White does not disclose modeling a temperature profile of the transfer chamber based on a change in state of a second processing chamber. White discloses that the controller derives the actual position of the translational position sensor relative to the position of end effectors using geometry of the robot's arms, not by modeling a temperature profile of the transfer chamber. Moreover, the translational position sensor is connected to the load lock (and slot) in a manner that when the load lock moves due to thermal expansion, the translational position sensor is similarly displaced (col 9, lines 40-58). In fact, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 21-23).

Therefore, Mitsui and White, alone or in combination do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: modeling a temperature profile of the transfer chamber based on a change in state of a second

processing chamber coupled to the transfer chamber as recited in claim 33. Applicant requests withdrawal of the rejection.

Regarding claim 34, the Examiner states that Mitsui shows all elements of claim 34 except wherein the detecting further comprises determining a temperature profile of the transfer chamber based on empirical data. The Examiner further states that White shows wherein the detecting further comprises determining a temperature profile of the transfer chamber based on empirical data (col 9, line 17-19).

However, White does not disclose determining a temperature profile of the transfer chamber based on empirical data. The exact slot position is not known due to thermal expansion of the substrate processing portion, but the controller translationally aligns the end effector or substrate with the slot in the load lock through communication with a translational position sensor, not a temperature profile. Furthermore, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 14-58).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: determining a temperature profile of the transfer chamber based on empirical data as recited in claim 34. Applicant requests withdrawal of this rejection.

Regarding claim 35, the Examiner states that Mitsui shows all elements of claim 35 except wherein the detecting further comprises determining a change in at least one of the position and orientation of a facet of the transfer chamber corresponding to a change in the sensed temperature. The Examiner further states that White shows wherein the detecting further comprises determining a change in at least one of the position and orientation of a facet of the transfer chamber corresponding to a change in the sensed temperature (col 9, line 17-19).

However, White does not teach determining a change in the position or orientation of a facet corresponding to a change in the sensed temperature. The exact slot position is not known due to thermal expansion of the substrate processing portion, but the controller translationally aligns the end effector or substrate with the slot in the load lock through communication with a translational position sensor, not a temperature sensor. Furthermore, the position of the slot is stored in memory contained in the

controller and is not calibrated to compensate for thermal expansion (col. 9, lines 14-58).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30 wherein the detecting further comprises: determining a change in at least one of the position and orientation of a facet of the transfer chamber corresponding to a change in the sensed temperature as recited in claim 35. Applicant requests withdrawal of this rejection.

Regarding claim 36, the Examiner states that Mitsui shows all elements of claim 36 except wherein the detecting further comprises sensing temperature of the transfer chamber at a plurality of locations. The Examiner further states that White shows wherein the detecting further comprises sensing temperature of the transfer chamber at a plurality of locations (col 9, line 9-23).

However, White does not teach sensing temperature of the transfer chamber at a plurality of locations. The lines cited by the Examiner teach that the exact slot position is not known due to thermal expansion of the substrate processing portion, but the controller translationally aligns the end effector or substrate with the slot in the load lock through communication with a translational position sensor, not a temperature sensor. Furthermore, the position of the slot is stored in memory contained in the controller and is not calibrated to compensate for thermal expansion (col. 9, lines 14-58).

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: sensing temperature of the transfer chamber at a plurality of locations as recited in claim 36. Applicant requests withdrawal of the rejection.

Regarding claim 37, the Examiner states that Mitsui shows all elements of claim 37 except wherein the detecting further comprises determining a change in at least one of position and orientation of the first processing chamber. The Examiner further states that White shows wherein the detecting further comprises determining a change in at least one of position and orientation of the first processing chamber (col 9, line 9).

However, White does not teach determining a change in the position or orientation of a processing chamber. In fact, the cited lines disclose that the

approximate position of the slot of the desired load lock is determined, not a change in position or orientation of a processing chamber.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: determining a change in at least one of a position and orientation of the first processing chamber as recited in claim 37. Applicant requests withdrawal of the rejection.

Regarding claim 38, the Examiner states that Mitsui shows all elements of claim 38 except wherein the detecting further comprises determining a change in a position of the reference point defined in the transfer chamber. The Examiner further states that White shows wherein the detecting further comprises determining a change in a position of the reference point defined in the transfer chamber (col 9, line 17-19).

However, White does not teach detecting a shift in the exchange position by determining a change in a position of the reference point defined in the transfer chamber. In fact, the lines cited by the Examiner disclose that the base of the robot is displaced along the robot travel path until the robot device is positioned in front of the approximate slot position in the load lock, not that a change in the position of a reference point is determined.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest the method of claim 30, wherein the detecting further comprises: determining a change in a position of the reference point defined in the transfer chamber as recited in claim 38.

Regarding claim 40, the Examiner states that Mitsui shows all elements of claim 40 except detecting a change in lateral position of a substrate support disposed in the first processing chamber. The Examiner further states that White shows detecting a change in lateral position of a first processing chamber (col 5, line 8).

However, White does not show detecting a change in lateral position of a substrate support disposed in a first processing chamber. In fact, the lines cited by the Examiner disclose that the load locks are typically calibrated when both load locks are cold, such that thermal expansion results in displacement of one (or both) load lock relative to the other. Thus, White discloses that thermal expansion results in

displacement of load locks, not detecting a change in lateral position of a substrate support disposed in a processing chamber.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot, the method comprising: establishing a predefined reference point within the transfer chamber and an exchange position of the first processing chamber; teaching a robot to move to the exchange position; monitoring relative positional change between the reference point and exchange position, wherein the monitoring the relative positional change between the reference point and exchange position further comprises detecting a change in lateral position of a substrate support disposed in the first processing chamber; and correcting the taught position of the robot in response to the relative positional change, thereby allowing the robot to arrive at the exchange position as recited in claim 40. Withdrawal of this rejection is respectfully requested.

Regarding claim 41, the Examiner states that Mitsui shows all elements in claim 41 except wherein the monitoring the relative positional changes between the reference point and exchange position further comprises detecting a change in lateral position of the reference point of the transfer chamber due to thermal changes of the transfer chamber. The Examiner further states that White shows wherein the monitoring the relative positional changes between the reference point and exchange position further comprises detecting a change in lateral position of the reference point of the transfer chamber (col 9, line 17-19).

However, White does not teach detecting a change in lateral position of the reference point of the transfer chamber due to thermal changes of the transfer chamber. In fact, the lines cited by the Examiner disclose that the base of the robot is displaced along the robot travel path until the robot device is positioned in front of the approximate slot position in the load lock, not that a change in the position of a reference point in the transfer chamber is determined.

Therefore, Mitsui and White, alone or in combination, do not teach, show or suggest a method for transferring a substrate in a processing system having at least a first processing chamber coupled to a transfer chamber housing a robot, the method



comprising: establishing a predefined reference point within the transfer chamber and an exchange position of the first processing chamber; teaching a robot to move to the exchange position; monitoring relative positional change between the reference point and exchange position, wherein the monitoring the relative positional change between the reference point and exchange position further comprises detecting a change in lateral position of the reference point of the transfer chamber due to thermal changes of the transfer chamber; and correcting the taught position of the robot in response to the relative positional change, thereby allowing the robot to arrive at the exchange position.

Regarding claim 45, the Examiner states that White shows all elements of claim 45 except wherein at least one sensor provides information indicative of a position of a substrate support disposed within the processing chamber. The Examiner further states that Mitsui shows wherein at least one sensor provides information indicative of a position of a substrate support disposed within the processing chamber ([0079]).

Applicant has amended claim 45 to recite “wherein the at least one sensor provides temperature information indicative of a position of a substrate support disposed within the processing chamber” to correspond with claim 42 from which claim 45 depends. Mitsui fails to show that at least one sensor provides temperature information indicative of a position of a substrate support disposed within the processing chamber.

Therefore, White and Mitsui, alone or in combination, do not teach, show or suggest the substrate processing system of claim 42, wherein the at least one sensor provides temperature information of the processing chamber as recited in claim 45.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant’s disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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Title: METHOD AND APPARATUS FOR DETERMINING A SUBSTRATE  
EXCHANGE POSITION IN A PROCESSING SYSTEM  
Inventors: DONGCHOON SUH, et al. FIG. 8

FIG. 8